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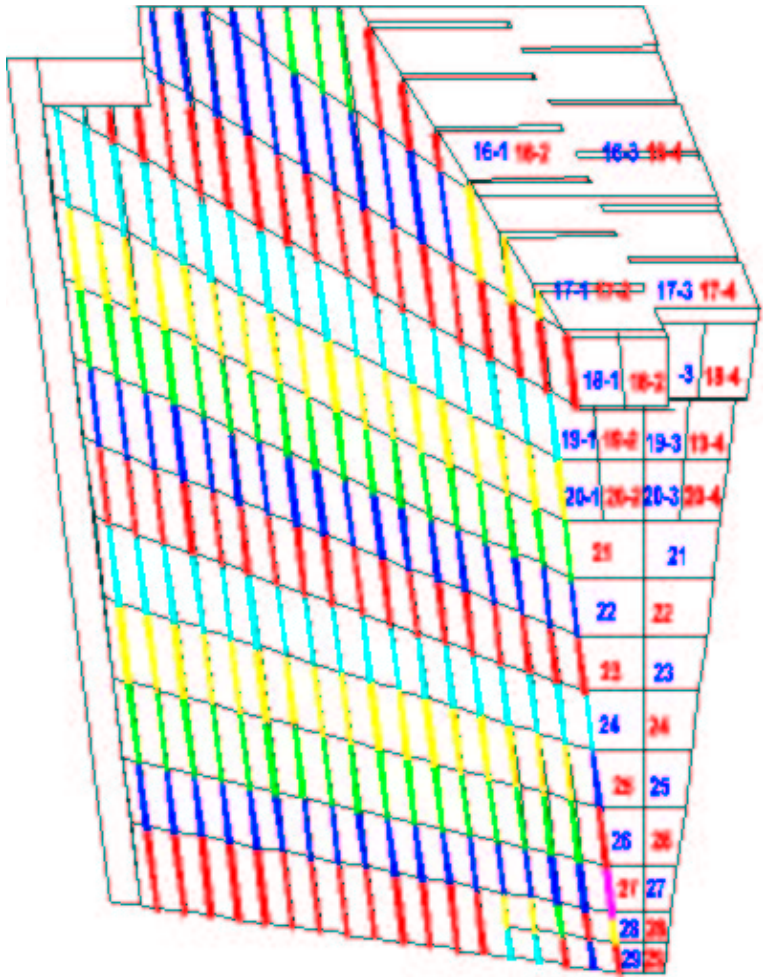
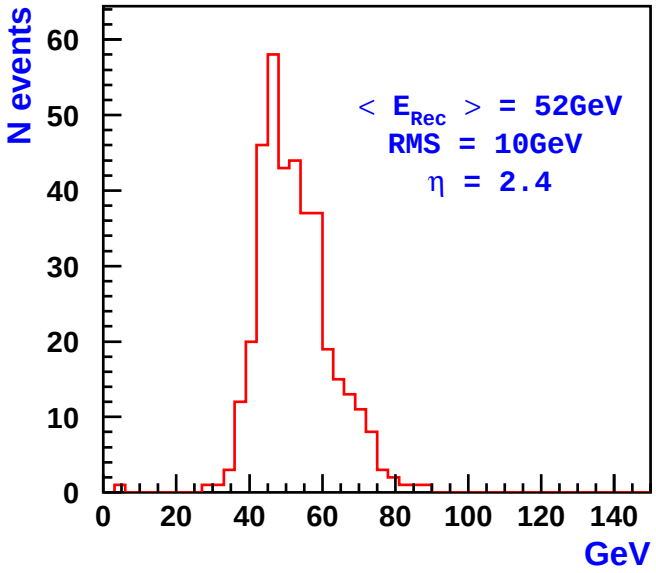
Effect of eta=3 Modification

Questions to be considered

- The additional subdivision of the last HE tower (28th) into two towers (28th and 29th)
- Separate readout (with longitudinal segmentation)
  Single readout (without longitudinal segmentation)
- Using more radiation hard Kharkov scintillator (UPS-98)





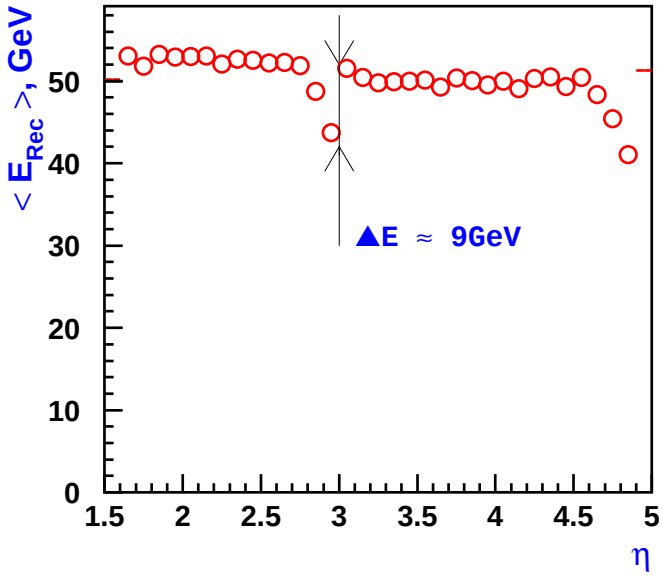
non uniformity of energy response

Δ E = 9 GeV (it's about 18%E_π, =RMS)

π - mesons, E=50GeV

$E_{REC} = \sum E_i$, i=1, ntowers

cmsim 121

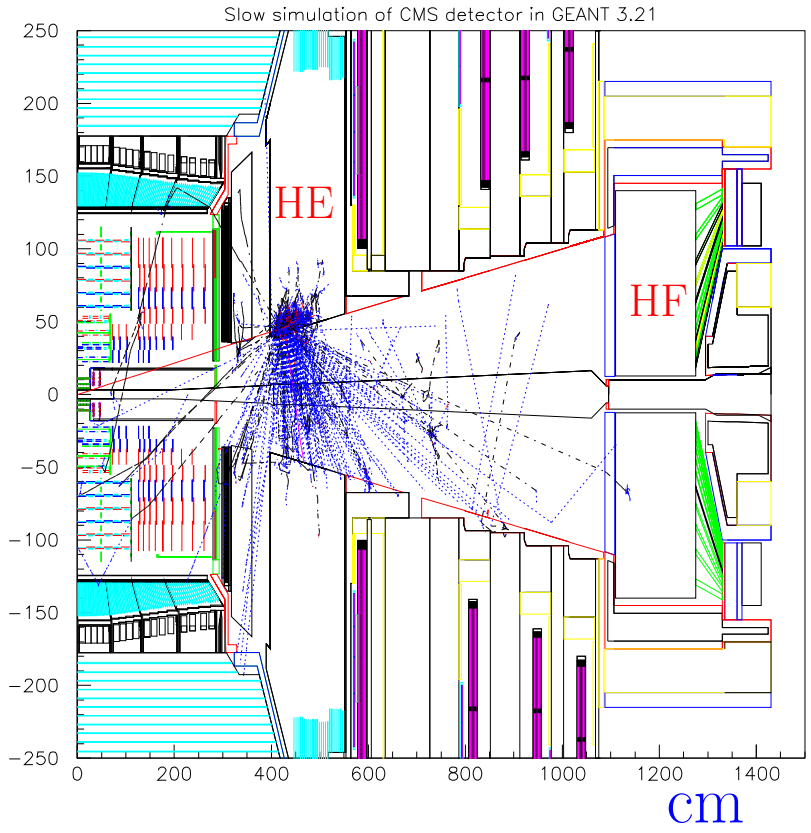


π-meson, (η=2.93)

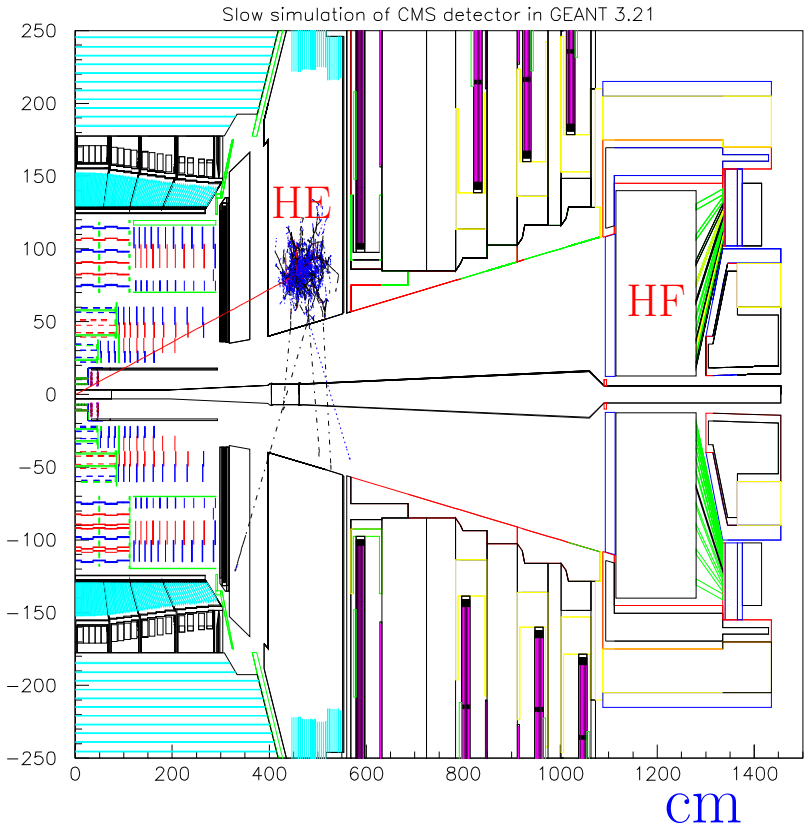
E_{HAD}=38.5GeV

E_{EM}=2.6GeV

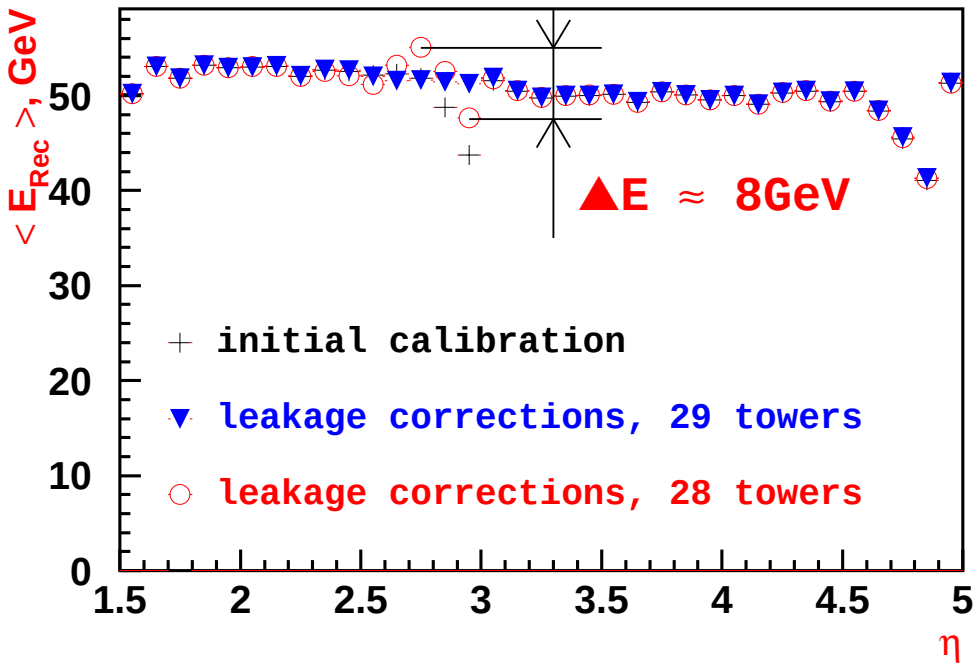
E_{HF}=0.GeV



π-meson, (η=2.45)



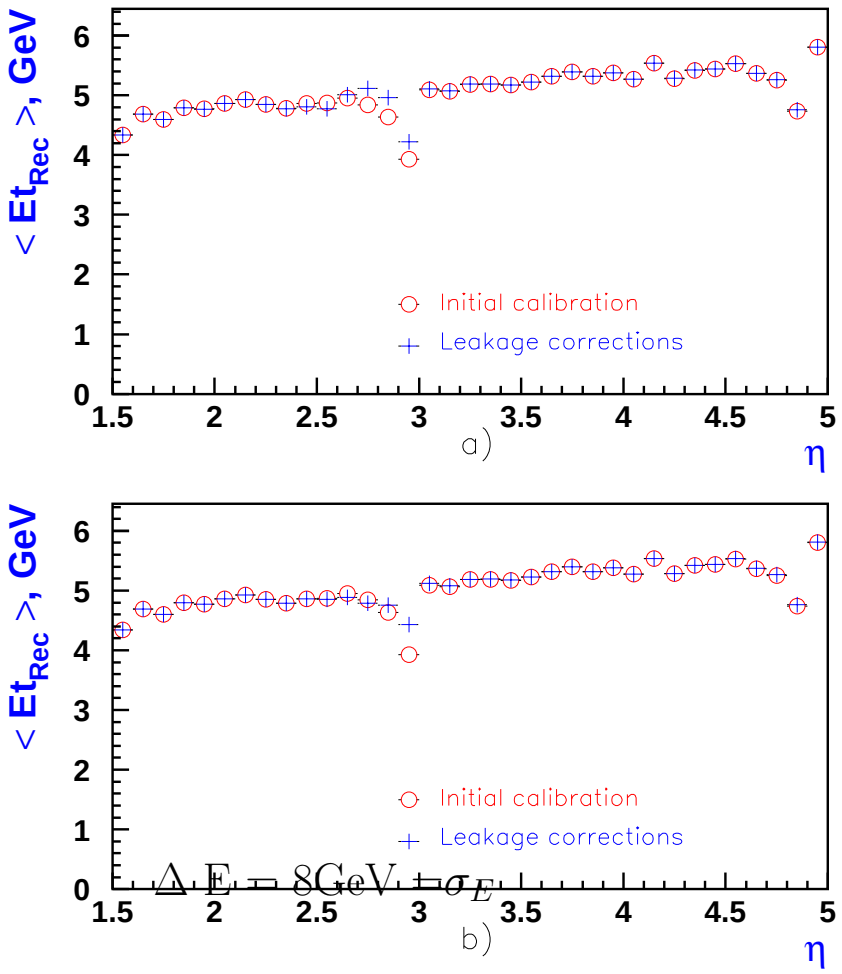
Leakage Corrections



Δ E = 8GeV =σ_E

- Try to apply additional correction coefficients to align energy response
- single coefficient for single tower
- 29 tower option:
  α_1 for 27th, α_2 - 28th, α_3-29th
  28 tower option:
  α_1 for 27th, α_2 - 28th

Leakage Corrections



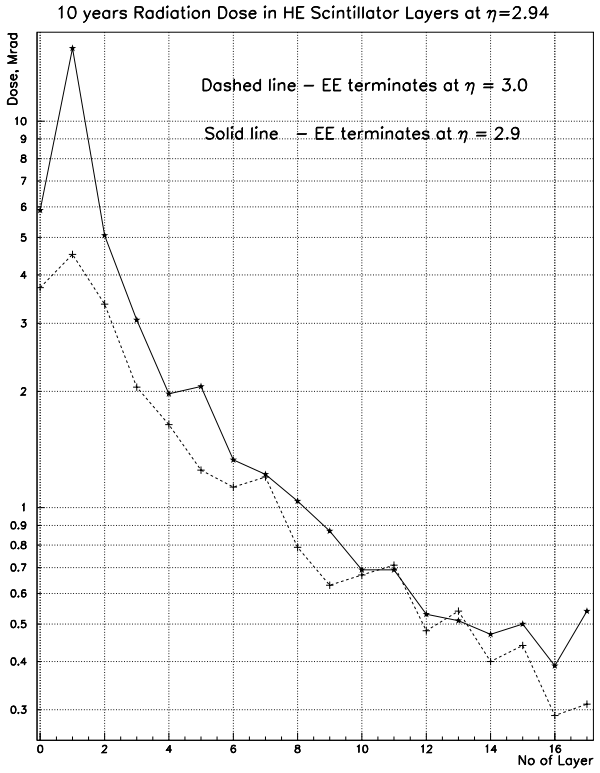
$\pi - mesons, \quad E_t = 5$ GeV

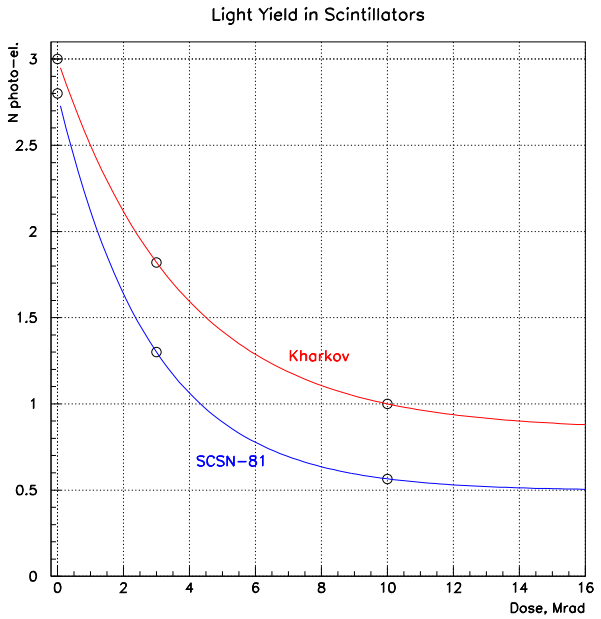
Correction coefficients derived to correct energy were used.

E_t is not completely recovered. It's because some part of E is taken with opposite ϕ value (look at page 4).

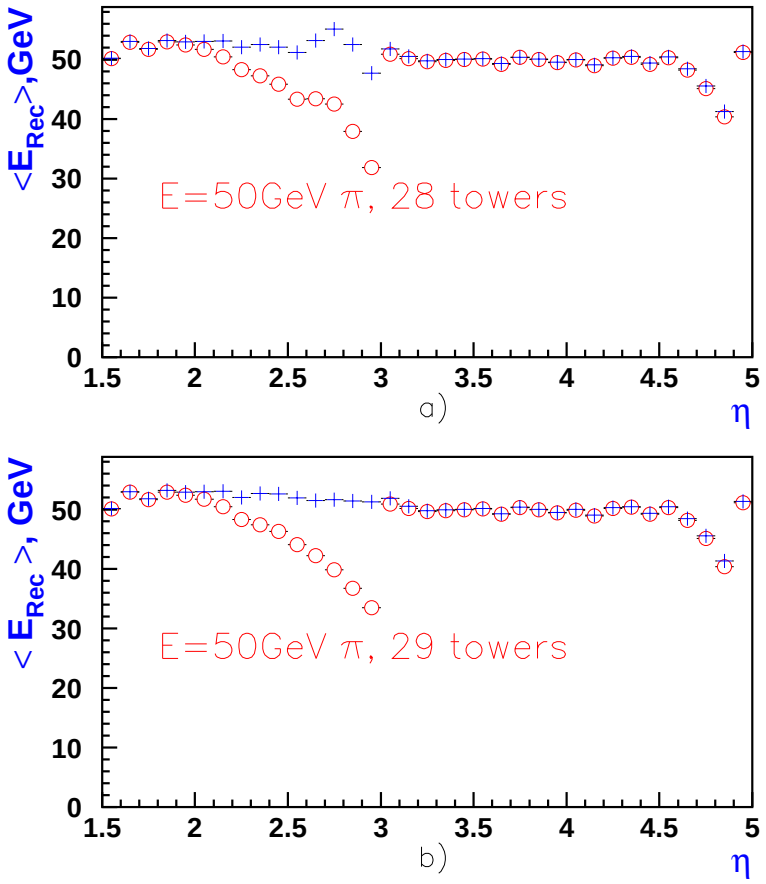
Absorbed dose and Reduction of light yield in scintillator

$$L = 5 \times 10^5 pb^{-1}$$





After Irradiation, $L = 5 \times 10^5 pb^{-1}$



Model:

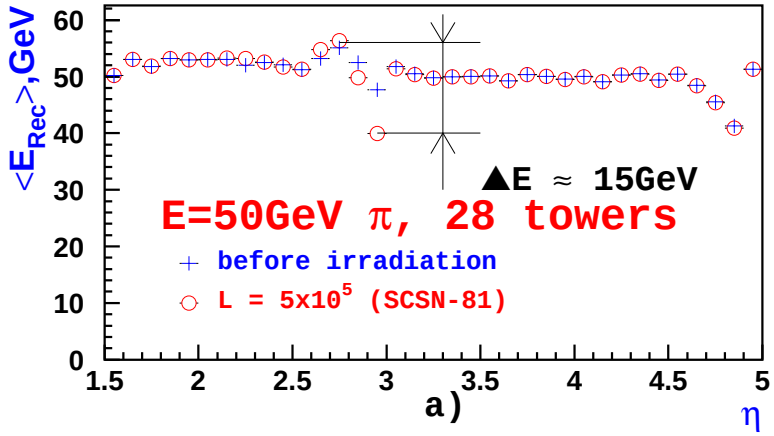
Radiation damages are assumed to be due drop in scintillator's light yield

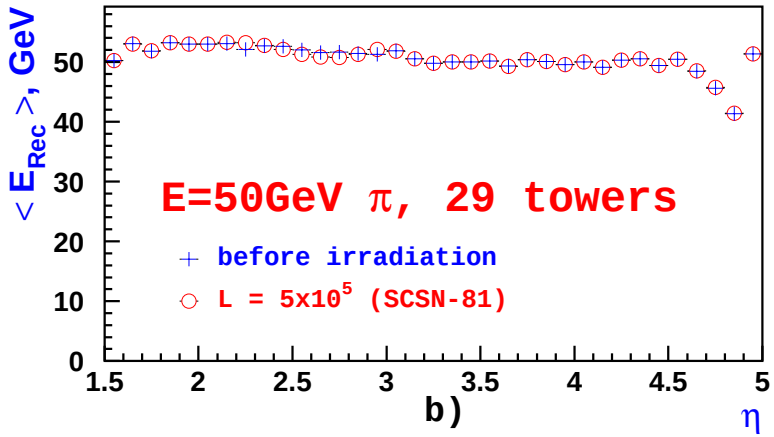
\+ - before irradiation

o - after irradiation

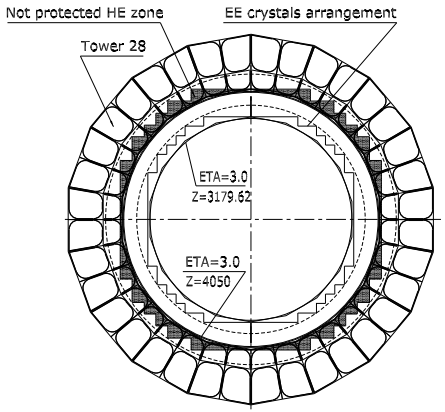
try to recover energy response $\longrightarrow$

After Irradiation, $L = 5 \times 10^5 pb^{-1}$
(Corrected response)

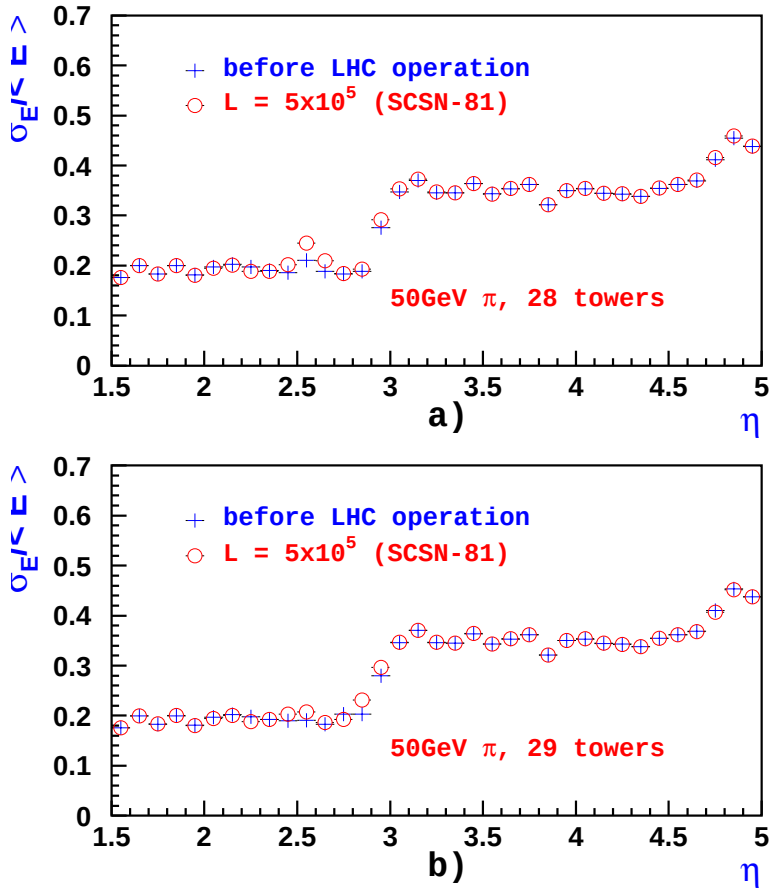




- E_{REC} is not completely recovered after correction procedure was applied
  ΔE=15GeV = 1.5 σ_E

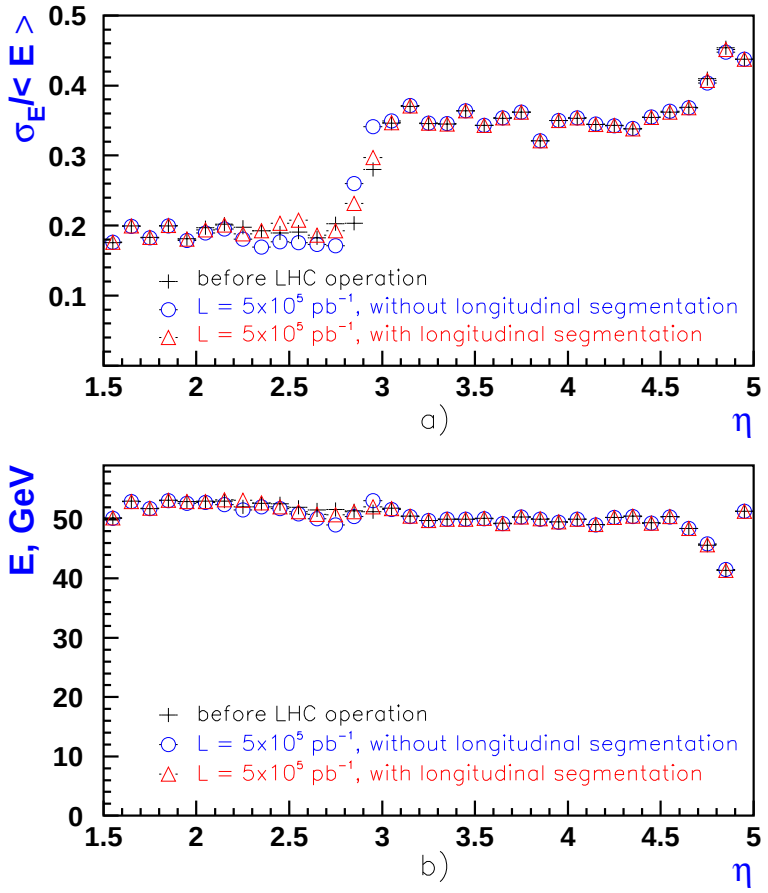


Resolution ($L = 5 \times 10^5 pb^{-1}$)



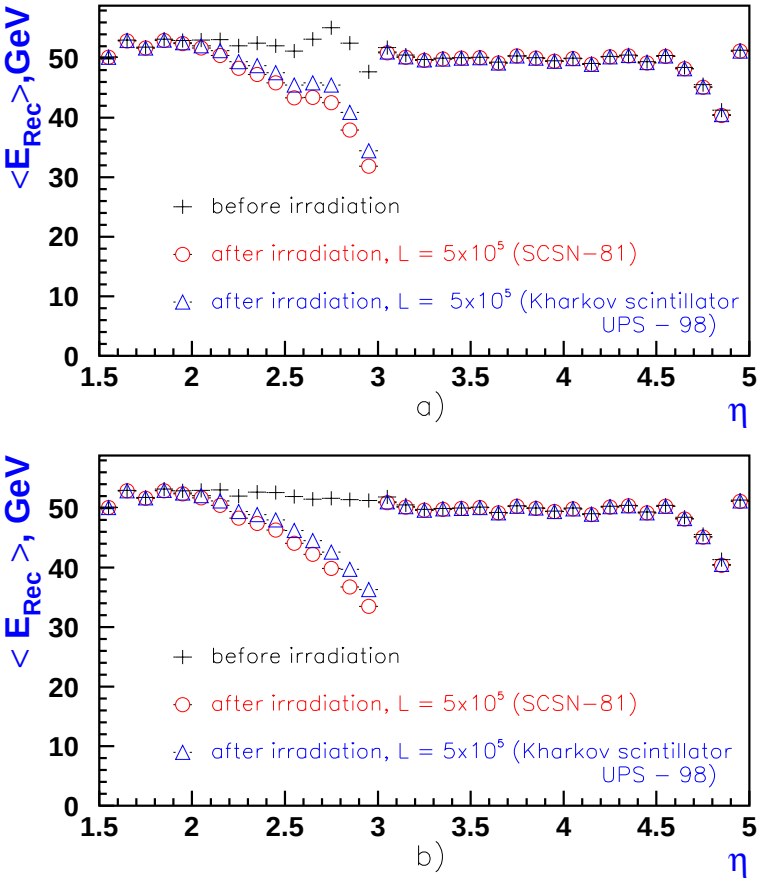
Resolution is almost the same both before and after irradiation

Single Readout (No longitudinal segmentation)



Without longitudinal tower segmentation resolution after irradiation is almost the same as before irradiation except small region around η=3

Kharkov Scintillator



- This scintillator is more radiation hard than SCSN-81
- Simulation Model:
  It was used at 0,1,2,3,4 layers
- The difference is negligible

Summary:

- 29 tower segmentation doesn't improve resolution but helps make energy response more uniform. Reliable monitoring is required in process of LHC operation.
- Without longitudinal tower segmentation resolution after irradiation is almost the same as before irradiation except small region around η=3